AAR-100

Human Factors Newsletter # 03-18

October 11, 2003 – October 31, 2003

Technical Report: *How Training Devices Are Actually Being Used by General Aviation Flight Training Organizations.* Michael E. Wiggins, Embry-Riddle Aeronautical University, Michael A. Crognale, University of Nevada, Reno.

The purpose of this study was to reveal the types of training devices in use, how they are being used to enhance skill and proficiency, which tasks are being taught in these devices, whether or not the devices are appropriately certified and being used in accordance with the National Simulator Program (NSP) guidelines, and if they are being used to augment training outside approved training curricula.

The study targeted 184 schools that had indicated use of at least one training device in the study by Wiggins, Hampton, Morin, Larssen & Troncoso (2002). Of the 184 schools targeted, 70 (38%) responded: 35 universities, 22 Part 141 schools, and 13 Part 61 schools. The study targeted training curricula for private pilot and commercial pilot certification and instrument and multiengine ratings. A survey was used to collect data in three primary areas: school demographics, device information, and tasks taught in training devices. In an attempt to standardize terminology, the Practical Test Standards (PTS) were used as the primary reference for the tasks taught. Common or similar Areas of Operations (AOO) from the four PTSs were combined in an attempt to have tasks listed only once. This resulted in 15 AOOs on the survey. Tasks from each PTS were placed under the most appropriate AOO. For each task, data were collected on the type of device used, for which certification level that task was taught, and on which learning domain the training was focused: knowledge, skill, or attitude (KSA).

Many schools, especially those in university environments and FAA approved schools appear to be using both FTDs and PCATDs a significant amount. Part 61 schools do not seem to use these devices as much. The data suggest that training devices are used primarily in instrument training, but certainly not limited to that course. The data cannot address the question of whether or not the use of these devices reduces overall flight training time significantly. There appears to be some confusion about training device certification, both for initial certification and continuing use. Most schools felt their FSDO was helpful with the certification of their devices. The data suggest that some schools and/or instructors are experimenting with ways to gain more training

value from these devices in courses other than instrument training. It might be helpful if some simple guidelines for device certification could be developed and distributed to all flight schools.

With respect to which tasks are being taught in FTDs, the majority seem to be in the area of instrument training. In most of the AOOs, instrument students show the highest use. A fairly sizable number of tasks were also being taught at the private school level. Slow Flight and Skills is an example of an Area of Operation where private students out number students in all other courses. The task Steep Turns, in the Performance Maneuvers Area of Operation, is another. In the Ground Reference Maneuvers Area of Operation, there is some indication of use for private pilot training and, to a much lesser degree, in commercial pilot training. Whether or not the increasing number of high quality visual displays that are on newer FTDs is contributing to this is not known. But it is likely that as newer FTDs with better visual displays are used, training in visual flight maneuvers is likely to increase. This is a potential area for further research. FTDs do not appear to be used as much in commercial and multiengine training as they are in private and instrument training, with the exception of those tasks specific to multiengine training.

Looking at the data on KSAs taught in the FTDs, there seems to be more emphasis on skills than on knowledge, and very little emphasis on attitudes or decision-making. It is possible that these devices may be unsuitable for attitude or decision-making training, or that this area is overlooked or misunderstood by instructors. Since the focus of most training is on the accumulation of knowledge and the development of skills, it may be assumed that decision-making is simply part of those skills and is not looked upon as a separate issue. Airline training in the past decade has evolved to include decision-making and resource management as an integral part of their programs. While it is true that airline training is different from general aviation certification training, it might be worth exploring whether or not some concepts or techniques from airline training can be applied to general aviation.

The use of PCATDs tends to mirror FTD use in most of the AOOs. However, there are some notable exceptions. Take-offs, Landings, and Go-Arounds is one such AOO. PCATDs are used more for private pilot training than for instrument training, whereas FTDs are used about the same for both courses. There are a small number of students who train the task Rectangular Courses in PCATDs. While this may seem meaningless on the surface, apparently at least one school believes that this training may be of some value. There are even a small number of students who train for multiengine tasks in PCATDs. In the teaching of KSAs in PCATDs, the data show similar trends as with FTD use, with the exception that in some instrument tasks, skills seemed to be emphasized more than knowledge.

Training aids show very little use in most Areas of Operations, with most of that use focusing on knowledge. However, the data show that some flight schools use these devices, so there may be some real value in their use. One factor that may be limiting the use of these devices by schools is that time in such devices cannot be used toward certification. It is not currently known how much students use programs such as Microsoft's Flight Simulator on their own and whether or not this contributes to success in training.

In summary, the data show that use of training devices is mostly in the instrument and private pilot training programs. The tasks are those involving airplane systems, navigation procedures

and instrument flying. Some use is indicated in other tasks, but to a much lesser degree. However, the fact that instructors are training students in tasks that are not related to instrument flying warrants attention and further investigation. Further controlled experiments are needed to address the question of whether or not flight training hours, and thereby costs, can be reduced by the use of FTDs and PCATDs in courses other than instrument training. For more information, see [Credit for Instrument Rating in a FTD" ... http://www.hf.faa.gov/gafunded.htm.](http://www.hf.faa.gov/gafunded.htm.)

Point of Contact: Kip Krebs, AAR-100

ARA Awards: Congratulations to those receiving awards at this year's ARA ceremony held at the Technical Center on October 23rd:

- Paul Krois, Randy Stevens, Mike Gallivan, Terry Kraus, Cathy Bigelow, and Gloria Kulsea received the Mission Excellence Award for their work on the ARA R, E&D OMB 'PART' Team. In order to implement the President's Management Agenda, OMB has been evaluating the cost effectiveness of various government projects and programs through the use of a Program Assessment Rating Tool (PART). For FY 2004, the OMB evaluated 234 programs, finding only 6% to be effective. Thanks to the efforts of this PART team, the FAA R, E&D program received a score of 92, and was deemed "effective, results achieved." "The team exhibited extraordinary skill in preparing documentation and explaining to OMB, as well as the OST, the links between the R, E&D budget, and national FAA and DOT goals, as well as the critical safety work being accomplished. By educating these key budget decision makers, the team helped to ensure the viability of the FAA's research efforts for years to come".

- Vicki Ashlstrom received the Individual Award for Safety. Vicki is responsible for publication of the Human Factors Design Standard, HF-STD-001. This document contains over 1000 pages of text and diagrams that provide critical human factors design information to numerous organizations in the FAA, private industry, the military, and our international partners. It also has wide ranging impact on many ARA programs, such as WAAS, LAAS, and ERAM, because the Human Factors Design Standard is now specified as a contractual reference for any procurement that has human interface. "Vicki has indeed produced the 'gold standard' for human factors design".

Point of Contact: Kip Krebs, AAR-100

Human Factors and Ergonomics (HFES) 47th Annual Meeting:

- **Recognition/Awards:** Congratulations to our human factors researchers who were recognized at the HFES 47th Annual Meeting. Dr. Philip J. Smith, co-director of the Institute for Ergonomics and professor in the Industrial and Systems Engineering Program at Ohio State University was presented as the newly-elected *2003 HFES Fellow*. The HFES selected Dr. Smith based on his research in such areas as "the design of cooperative problem-solving systems to aid people in performing complex tasks such as information retrieval and display", and his studies of "constancy in performance across different application contexts in order to establish generalizations regarding human

performance within complex systems". The HFES also recognized products of Dr. Smith's research, including "the Post-Operations Evaluation Tool, which provides access to data on all flights in the US airspace system over the past 35 days, and includes data-mining tools to identify and assess significant problems". Mica R. Endsley received the *Jack A. Kraft Innovator Award*. The HFES selected Dr. Endsley "for her work on the development, theory, and application of the construct of situational awareness". "Dr. Endsley's work…on methodology has clarified and broadened the concept and measurement of situational awareness". (P. Krois, AAR-100)

- **Information Displays:** Dr. Jing Xing gave an oral presentation of her paper entitled *A Framework for Developing Evaluation Metrics of Information Complexity in Automation Displays*. Below is the abstract of the paper. (D. Schroeder, CAMI):

  This report addresses whether information displayed by an automation tool facilitates task performance. While the tools are intended to provide decision support and offload tasks from controllers, they also create new tasks associated with entering, retrieving and processing information. Dissonances between multiple tools further increase the system complexity. The question is how to evaluate the information complexity of an automation tool. Using the air traffic control system as a model of dynamic human-automation interaction, we proposed a framework for developing objective evaluation metrics of information complexity in automated display systems. The framework postulated that the information complexity should be evaluated at three levels of constraint: physical constraint, human constraint, and system constraint. Each constraint can have multiple factors that contribute to information complexity. The framework incorporated many human factors studies on interface evaluation. We expect this framework to serve as a guideline for future research in designing and evaluating the information display of automation tools.

- **Airport Surface Information Displays**: Michelle Yeh presented a paper titled *Air Transport Pilots' Information Priorities for Surface Moving Maps.*. The paper discusses the results of a study in which air transport pilots rated the value of different types of information for conducting operations on or near the airport surface. The ratings identified a set of items considered to be of high value across all operational phases, but also emphasized the shifting need for information across different phases. (M. Yeh, VNTSC, T. McCloy, AAR-100)

ETMS: Tanya Yuditsky/ACB-220 traveled to the Volpe National Transportation Systems Center to attend the Design Review for Version 7.8 of the Enhanced Traffic Management System (ETMS). Software developers from Volpe presented interface and architectural designs for all of the functions and enhancements that are scheduled for the Version 7.8 release. One of the ETMS enhancements, dynamic sectorization, will allow users to see true sector configurations and accurate traffic counts for combined sectors. Previously, ETMS did not know about combined sectors, and presented sector traffic counts for the baseline configuration where all sectors are de-combined. ETMS will continue to provide baseline traffic counts for closed sectors in addition to traffic counts for the current, combined sector configurations. (E. Stein, WJHTC)

OCC: Vicki Ahlstrom/ACB-220 traveled to Washington to conduct a briefing on the preliminary results of a study on AF Operations Control Centers (OCC) communication and coordination for the OCC. This briefing is a follow-up to the October 7th briefing to AOP-1, AOP-30 and AOP-100. For this study, a representative of ACB-220 traveled to each of the three OCCs and collected data using a survey format. The questions from the survey covered a broad range of topics related to communication and coordination, from the number of specialists, the equipment used, the relationship with the customers, and internal communication and coordination. Respondents provided ratings and comments explaining their ratings. Suggestions for ways to improve communication and coordination will be presented. (E. Stein, WJHTC)

Human Performance Modeling Workshop: FAA and NASA sponsored a human performance modeling workshop at NASA-Ames Research Center on October 21-23. The specific focus of this workshop was on air traffic controller workload modeling and its relationship with en route airspace capacity assessments. The workshop briefings included several case studies from U.S. and Europe that involved workload modeling. The workshop also involved several moderated discussions on the human performance modeling applications related to workload, data needs for calibration of models, various theoretical foundations for workload modeling, validation process, and open research issues. The workshop was attended by 35 researchers including five European researchers. The need for collaboration among different modeling experts, and the need to examine characteristics and strengths of various models and modeling approaches were identified. For agenda, presentations, and other information, please visit the website: https://postdoc.arc.nasa.gov/postdoc/t/folder/main.ehtml?url_id=120490. The workshop was organized by Parimal Kopardekar, FAA ACB-100 at NASA Ames Research Center who can be reached at pkopardekar@mail.arc.nasa.gov.

Electronic Flight Bag (EFB): On October 15th, Divya Chandra presented her EFB research to a meeting of the Airline Transport Association (ATA) Digital Display Working Group (DDWG) in Englewood, CO. The DDWG consists of airlines and EFB vendors. Dr. Chandra discussed, in detail, the latest revision of the EFB human factors considerations document and Volpe research towards developing tools and methods for evaluating the usability of EFBs. An updated EFB report (Version 2) was submitted to the FAA for final review on September 30th. The document is more mature and polished than the draft version from one year ago that the industry and FAA are currently using. The latest document also includes two new sections, an EFB industry snapshot, and a summary version of high-priority guidance on EFB equipment design and evaluation. The EFB industry is eager to get the final Version 2 EFB report, which will be posted at the Volpe EFB website after FAA approval is received. For more information, please go to the following Web site: http://www.volpe.dot.gov/opsad/efb. A paper on the Volpe EFB research was also recently published in the Proceedings of the 22nd Digital Avionics Systems Conference held in October 2003 in Indianapolis. (D. Chandra, VNTSC, T. McCloy, AAR-100)

AQP: Eleana Edens and several Air Transportation Human Factors Research scientists presented FAA project overviews at the 13th Annual Air Transport Association (ATA) Advanced Qualification Program (AQP) Working Group Conference in Cincinnati, October 7-9, 2003. The conference was sponsored by the ATA Training Committee, and hosted by ASTAR Aviation, fomerly DHL. The conference was attended by over 150 air carriers from around the world. Dr. Edens presented an overview of the Air Transportation Human Factors Research

program. Dr. Florian Jentch (University of Central Florida) presented the latest findings from flight deck automation, unexpected events, and scenario development projects. Susan Mangold and David Neumeister (Battelle) presented the latest Model AQP software, and Dr. Peder Johnson and Dr. Tim Goldsmith (University of New Mexico) presented their latest findings on instructor/evaluator calibration training. Following the presentations, several carriers expressed interest in participating in future studies. This meeting attracted many carriers that had not previously attended AQP conferences, and several of theses new carriers will use the research projects in their training departments. (E. Edens, AFS-230)

Simulator Motion: Eleana Edens and Dr. Judith Burki-Cohen (Volpe NTSC) held a one-day conference for the National Simulator Program Office in Atlanta on October 16 to discuss the latest results of the Simulator Motion Requirements study done in cooperation with NASA-Ames. The meeting was attended by the director of the National Simulator Program Office, Dr. Ed Cook, and several of his aviation safety inspectors, along with simulator engineer specialists. This office sponsors the Voluntary Safety Programs Office and FAA simulator research. (E. Edens, AFS-230)

FAA Flight Plan: The FAA Flight Plan for 2004-2008 has been published and is now available on the FAA web site. You can access it from the FAA's brand new home page: http://www1.faa.gov/avr/FlightPlan/.

R&D Review: The fall issue of *R&D Review*, focusing on CAMI's human factors and medical research, is now being distributed. You can also view the issue on-line at: http://research.faa.gov/docs/newsletters/rdreview_v02_i03.pdf.

*More information on human factors research can be found at
the FAA Human Factors (AAR-100) web site*: http://www.hf.faa.gov

Mark D. Rodgers
FAA (AAR-100)

 CALENDAR

November, 4-6, 2003(tentative) – DOD TAG-50, Fall 2003, Phoenix, AZ
http://hfetag.dtic.mil/meetschl.html

November 4-5, 2003 – NASA/FAA Operating Documents Workshop VI: Updating your Data – The Future of Revisions. Orlando Airport Marriott Hotel, Orlando FL. http://human-factors.arc.nasa.gov/opdoc-workshopV/

November 4-6, 2003 – People in Control, 2003 – An International Conference on Engineering Human Factors Solutions, Hilton Amsterdam *http://conference.iee.org/pic2003/*

November 5-6, 2003 – Royal Aeronautical Society Flight Simulation Group Conference on "Simulation of the Environment", London, UK http://www.raes.org.uk/homepage.asp

November 5-7, 2003 – ICAO-IATA Line Operation Safety Audit & Threat and Error Management Conference, Great Southern Hotel, Dublin, Ireland mailto:sladenj@iata.org, mailto:dmaurino@icao.int

November 5-7, 2003 – FAA Centers of Excellence 3rd Joint Annual Meeting, Daytona Beach Hilton Oceanside Resort, Daytona Beach, FL *http://www.embryriddle.edu/research/FAA_COE_Meeting/index.html*

November 5-7, 2003 – 5th International Conference on Multi-Modal Interfaces, Marriott Vancouver Pinnacle Hotel, Vancouver, British Columbia, Canada *http://www.acm.org/uist/*

November 10-13, 2003 – 56th Annual International Air Safety Seminar, J.W.Marriott Hotel, Wash, DC *http://www.flightsafety.org/seminars.html#iass*

November 17-20, 2003 – 56th Annual Air Safety Seminar, A Joint Meeting of Flight Safety Foundation, International Federation of Airworthiness, and International Air Transport Association, Bangkok, Thailand http://www.flightsafety.org/seminars.html

November 17-22, 2003 – Airbus A300/A310 Technical Symposium, Seville, Spain *http://www.airbus.com/customer/events.asp*

December 1-4, 2003 – International Symposium on Human Factors in Telecommunications, Berlin, Germany *http://impcs3.hhi.de/HFT/HFT_03.htm*

December 2-4, 2003: National Training Systems Association Inter-Service/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, FL *http://www.trainingsystems.org*

December 3-5, 2003 – FAA System Engineering Annual Workshop with Information Systems Security – Meeting Real World Challenges, Holiday Inn, Atlantic City, NJ *http://se-iss.tc.faa.gov*

December 9-12, 2003 - Institute of Electrical and Electronics Engineers (IEEE) Decision and Control Conference, Maui, HI *http://www2.acae.cuhk.edu.hk/~ycliu/cdc03/*

December 12-13, 2003 – Workshop on HCI Research in MIS, Seattle, WA *http://melody.syr.edu/hci/pre_icis03_wksp/index.cgi*

January 11-15, 2004 – Transportation Research Board Annual Meeting, Washington, DC http://www4.trb.org/trb/annual.nsf

January 13-15, 2004 – SAE SEAT –Aircraft Seat Committee Meeting, Phoenix, AZ mlemank@sae.org

January 13-16, 2004 – International Conference on Intelligent User Interfaces/Computer-Aided Design of User Interfaces, Island of Madeira, Portugal *http://www.iuiconf.org/*

January 18-22, 2004 – Conference on Visualization and Data Analysis, San Jose Marriott and San Jose Convention Center, San Jose, CA *http://vw.indiana.edu/vda2004/*

January 21 – 23, 2004 - AHS 4th Decennial Specialists' Meeting on Aeromechanics, Fisherman's Wharf, San Francisco, CA. For more information contact the Technical Chairman, Tom Maier at tmaier@mail.acr.nasa.gov

March 8-11, 2004 – SAE World Congress, Cobo Hall, Detroit, MI
http://www.sae.org/congress/index.htm

March 15-17, 2004 – 16th Annual European Aviation Safety Seminar, Barcelona, Spain *http://www.flightsafety.org/eass04_cfp.html*

March 22-24, 2004 – Eye Tracking Research and Applications Symposium, Menger Hotel, San Antonio, TX *http://www.e-t-r-a.org/*

March 22-25, 2004 – HPSAA II Conference, Human Performance, Situation Awareness, and Automation Technology, hosted by Embry-Riddle Aeronautical University and the University of Central Florida, Hilton Oceanfront Resort, Daytona Beach, FL
http://faculty.erau.edu/vincenzd/hpsaa

March 23-26, 2004 – 4th International Workshop on Smart Appliances and Wearable Computers, Tokyo, Japan *http://www.unl.im.dendai.ac.jp/IWSAWC/*

April, 2004 – SAE General Aviation Technology Conference and Exhibition, Century II Convention Center, Wichita*, KS* http://www/sae.org/calendar/aeromtgs.htm

April 18-21, 2004 – FAA Worldwide Airport Technology Transfer Conference, Hilton Atlantic City Hotel, Atlantic City, NJ *http://www.airtech.tc.faa.gov/att04/*

April 20-22, 2004 – SAE General Aviation Technology Conference and Exhibition, Century 21 Convention Center, Wichita, KS http://www.sae.org/calendar/aeromtgs.htm

April 24-29, 2004 – CHI 2004, Conference on Human Factors in Computing Systems, Vienna, Austria *http://www.acm.org/sigchi/chi2004/*

April 25-28, 2004 – SAE Cabin Safety Technical Committee Meeting, Oklahoma City, OK
mlemank@sae.org

April 27-29, 2004 – 49th Annual Corporate Aviation Safety Seminar, Tucson, AZ
http://www.flightsafety.org/cass04_cfp.html

May 3-6, 2004 – SAE Aircraft Oxygen Equipment Committee, Anchorage, AK
mlemank@sae.org

May 3-6, 2004 – 75th Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK http://www.asma.org/

May 6-8, 2004 - AHS International 60th Annual Forum and Technology Display, Virginia Beach, VA. Contact Staff@vtol.org

May 10-12, 2004 – Royal Aeronautical Society 10th AIAA CEAS Aeroacoustics Conference, Manchester Town Hall, UK *http://www.aerosociety.com/homepage.asp*

May 11-13, 2004 – SAE SEAT – Aircraft Seat Committee, Savannah, GA mlemank@sae.org

May 26-27, 2004 – Royal Aeronautical Society Conference – Flight Simulation 1929-2029, A Centennial Perspective, London, UK *http://www.aerosociety.com/homepage.asp*

June 15-17, 2004 – SAE Digital Human Modeling for Design and Engineering Meeting, Oakland University, Rochester, Michigan http://www.sae.org/calendar/aeromtgs.htm

July 27-August 2, 2004 – 52nd Annual AirVenture, Oshkosh, WI http://airventure.org/

July 28 – August 1, 2004 – 112th Convention of the American Psychological Association. Honolulu, Hawaii http://www.apa.org/convention

August 1-4, 2004 – Designing Interactive Systems, Cambridge, MA *http://www.sigchi.org/DIS2004/*

September 20-24, 2004 – Human Factors and Ergonomics Society 48th Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA http://www.hfes.org/

September 29 – October 1, 2004 – 2004 International Conference on Human Computer Interaction (HCI-Aero), Toulouse, France http://www.eurisco-international.com/hci-aero2004.

October, 2004 – 18th Airbus/JetBlue Human Factors Symposium, New York City, NY *http://www.airbus.com/customer/events.asp*

October 4-7, 2004 – SAE SEAT – Aircraft Seat Committee Meeting, Albuquerque, NM mlemank@sae.org

October 18-19, 2004 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC *http://wwwsearch.nationalacademies.org/*

October 23-27, 2004 – NordiCHI 2004, Tampere, Finland *http://www.cs.uta.fi/nordichi2004/*

October 25-28, 2004 – SAE S-9 Cabin Safety Technical Committee Meeting, San Diego, CA mlemank@sae.org

October 25-28, 2004 – DoD Maintenance Seminar and Exhibition, Hilton Americas, Houston, TX http://www.sae.org/calendar/aeromtgs.htm

April 11-15, 2005 – SAE 100th Anniversary World Congress, Cobo Hall, Detroit, MI http://www.sae.org/congress/about/news/congressdates.htm

May 9-12, 2005 - 76th Annual Scientific Meeting of the Aerospace Medical Association, Kansas City, MO *http://www.asma.org/*

August 18-21, 2005 - 113th Convention of the American Psychological Association, Wash, DC http://www.apa.org/convention

September 26-30, 2005 – Human Factors and Ergonomics Society 49th Annual Meeting, Royal Pacific Resort at Universal Orlando, Orlando, FL http://hfes.org/meetings/menu.html

October 24-25, 2005 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, *DC http://wwwsearch.nationalacademies.org/*

Note: Calendar events in Italics are new since the last Newsletter

Comments or questions regarding this newsletter?
Please contact Bill Berger at (334) 271-2928
or via e-mail at bill.ctr.berger @faa.gov